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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/577,472	04/27/2006	Shunpei Yamazaki	0756-7681	6667

31780 7590 10/28/2009

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EXAMINER	
HANLEY, BRITT D	

ART UNIT	PAPER NUMBER
2889	

MAIL DATE	DELIVERY MODE
10/28/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/577,472	YAMAZAKI ET AL.	
	Examiner	Art Unit	
	BRITT D. HANLEY	2889	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 August 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 August 2009* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

01 Amendment filed on 08/10/2009 has been entered and noted by Examiner. Claims 1-41 are pending.

Claim Rejections - 35 USC § 103

02 The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

03 The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

04 Claims 1-8, 10-12, 14-16, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant cited Akihiro *et al.* (JP2000-306669) in view of Tokito *et al.* (Metal oxides as a hole-injecting layer for an organic electroluminescent device) and Tanaka *et al.* (Organic EL device using SrO_x as an electron injection material).

05 Regarding claim 1, Akihiro *et al.* disclose a light-emitting element comprising: at least a first electrode (2) and a second electrode (4); a first layer (5) between the first electrode and the second electrode (Figure 3), said first layer including a first organic compound and a first inorganic (paragraph 12); a second layer (3) between the first layer and the second electrode (Figure 3), said second layer including a second organic compound that is luminescent and a second inorganic compound (paragraph 12); and a third layer (6) between a second layer and the second electrode (Figure 3), said third layer including a third organic compound and a third inorganic compound (paragraph 12). Akihiro *et al.* do not explicitly appear to disclose that the first inorganic compound exhibits an electron accepting property to the first organic compound or that the third inorganic compound exhibits an electron donating property to the third organic compound. Akihiro *et al.* disclose that the first, second, and third inorganic material is a silica matrix (paragraph 12), and according to Applicant's specification, silica matrix does not exhibit charge transport properties (it is an insulating material).

06 In the same field of OLEDs, Tokito *et al.* disclose a metal oxide in combination with an organic hole transport layer in order to lower the driving voltage.

07 Tanaka *et al.*, in the same field of OLEDs, disclose a metal oxide used as an electron injection material in order to improve the device luminance and lifetime.

08 At the time the invention was made, it would have been obvious to a person having ordinary skill in the art having the references of Akihiro *et al.*, Tokito *et al.*, and Tanaka *et al.* to modify OLED of Akihiro *et al.* to include the metal oxides of Tokito *et al.* and Tanaka *et al.* in order to decrease the drive voltage and increase the device luminance and lifetime.

09 Regarding claims 2 and 3, the combination of Akihiro et al., Tanaka et al., and Tokito et al. disclose the limitations of claim 1.

10 Further, Akihiro *et al.* disclose that the first organic compound is a hole transport material (paragraph 40) that can be of aromatic amine skeleton type (tables 1-4).

11 Regarding claims 4 and 5, the combination of Akihiro et al., Tanaka et al., and Tokito et al. disclose the limitations of claim 1.

12 Further, Akihiro *et al.* disclose that the third organic compound is an electron transport material and one of one of a chelate metal complex having a chelate ligand including an aromatic ring, an organic compound having a phenanthroline skeleton, and an organic compound having an oxadiazole skeleton (paragraph 40, tables 9-11).

13 Regarding claims 6-8, the combination of Akihiro et al., Tanaka et al., and Tokito et al. disclose the limitations of claim 1.

14 Further, Tanaka *et al.* disclose that the first inorganic compound is a metal oxide of VO_x, MoO_x, or RuO_x (see introduction). The motivation to combine is the same as in claim 1.

15 Regarding claims 10-12, the combination of Akihiro et al., Tanaka et al., and Tokito et al. disclose the limitations of claim 1.

16 Further, Akihiro *et al.* disclose that the luminescent organic material is disposed in a silica matrix (paragraph 12).

17 Regarding claims 14-15, the combination of Akihiro et al., Tanaka et al., and Tokito et al. disclose the limitations of claim 1.

18 Further, Tokito *et al.* disclose a third inorganic compound is a metal oxide, such as an alkaline earth metal oxide, in particular SrO_x. The motivation to combine is the same as in claim 1.

19 Regarding claim 16, the combination of Akihiro et al., Tanaka et al., and Tokito et al. disclose the limitations of claim 1. Tokito *et al.* disclose that the metal oxide is SrO_x, and not one of lithium oxide or barium oxide. However, at the time of the invention, one of ordinary skill in the art would have tried barium oxide or lithium oxide because of the similar properties to strontium oxide, such as low work function and electron emission properties.

20 Regarding claim 39, the combination of Akihiro et al., Tanaka et al., and Tokito et al. disclose the limitations of claim 1. The combination teach a OLED display that can be used in an electronic appliance selected from the group consisting of a video camera, a digital camera, a goggle-type display, head mount display, a navigation system, a sound reproduction device, an in-car audio system, a audio component, a personal computer, a game machine, a personal digital assistance, a mobile computer, a cellular phone, a portable game machine, an electronic book, and an image reproduction device equipped with a recording medium.

21 Claims 9, 13, and 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant cited Akihiro *et al.* (JP2000-306669), Tokito *et al.* (Metal oxides as a hole-injecting layer for an organic electroluminescent device), and Tanaka *et al.* (Organic EL device using SrO_x as an electron injection material) in view of Tsutsui *et al.* (US 2005/0123751 A1).

22 Regarding claims 9, 13, and 17-19, the combination of Akihiro et al., Tanaka et al., and Tokito et al. disclose the limitations of claim 1, but are silent regarding the use of metal nitride as the first, second, or third inorganic compound.

23 However, in the same field of OLEDs, Tsutsui et al. disclose a metal nitride (such as Ca_3N_2 or Mg_3N_2, paragraphs 21-25) for use in electrodes for hole injection, electron injection, or both hole and electron injection.

24 At the time the invention was made, it would have been obvious to a person having ordinary skill in the art having the references of Akihiro et al., Tanaka et al., Tokito et al., and Tsutsui *et al.* to modify the inorganic compounds of Akihiro et al., Tanaka et al., and Tokito et al. to include the metal nitrides of Tsutsio *et al.* in order to increase the adhesion of the layers to the luminescent layer (abstract, Tsutsio *et al.*).

25 Claims 20-38 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant cited Akihiro *et al.* (JP2000-306669), in view of Tokito *et al.* (Metal oxides as a hole-injecting layer for an organic electroluminescent device), Tanaka *et al.* (Organic EL device using SrO_x as an electron injection material), and Tsutsui *et al.* (US 2005/0123751 A1).

26 Regarding claim 20, Akihiro *et al.* disclose a light-emitting element comprising: at least a first electrode (2) and a second electrode (4); a first layer (5) between the first electrode and the second electrode (Figure 3), said first layer including a first organic compound and a first inorganic (paragraph 12); a second layer (3) between the first layer and the second electrode (Figure 3), said second layer including a second organic compound that is luminescent and a second inorganic compound (paragraph 12); and a third layer (6) between a second layer and the second electrode (Figure 3), said third layer including a third organic compound and a third inorganic compound (paragraph 12). Akihiro *et al.* do not explicitly appear to disclose that the first inorganic compound exhibits an electron accepting property to the first organic compound or that the third inorganic compound exhibits an electron donating property to the third organic compound. Akihiro *et al.* also fail to disclose a fourth layer between the third layer and the second electrode that includes a fourth organic compound and a fourth inorganic compound exhibiting an electron accepting property to the fourth organic compound. Akihiro *et al.* disclose that the first, second, and third inorganic material is a silica matrix (paragraph 12), and according to Applicant's specification, silica matrix does not exhibit charge transport properties (it is an insulating material).

27 In the same field of OLEDs, Tokito *et al.* disclose a metal oxide in combination with an organic hole transport layer in order to lower the driving voltage.

28 Tanaka *et al.*, in the same field of OLEDs, disclose a metal oxide used as an electron injection material in order to improve the device luminance and lifetime.

29 Further, Tsutsei *et al.* disclose in Figure 1c and paragraph 25 a layer that exhibits both electron accepting and donating properties by mixing a low work function inorganic compound and a high work function inorganic compound in an organic matrix. This composite layer can function as the claims third and fourth layer.

30 At the time the invention was made, it would have been obvious to a person having ordinary skill in the art having the references of Akihiro *et al.*, Tokito *et al.*, Tanaka *et al.*, and Tsutsui et al. to modify OLED of Akihiro *et al.* to include the metal oxides of Tokito *et al.*, Tanaka *et al.*, and Tsutsui *et al.* in order to decrease the drive voltage and increase the device luminance and lifetime.

31 Regarding claims 21 and 22, the combination of the combination of Akihiro et al., Tanaka et al., Tokito et al., and Tsutsui *et al.* disclose the limitations of claim 1.

32 Further, Akihiro *et al.* disclose that the first organic compound is a hole transport material (paragraph 40) that can be of aromatic amine skeleton type (tables 1-4).

33 Regarding claims 23 and 24, the combination of Akihiro et al., Tanaka et al., Tokito et al., and Tsutsui *et al.* disclose the limitations of claim 1.

34 Further, Akihiro *et al.* disclose that the third organic compound is an electron transport material and one of one of a chelate metal complex having a chelate ligand including an aromatic ring, an organic compound having a phenanthroline skeleton, and an organic compound having an oxadiazole skeleton (paragraph 40, tables 9-11).

35 Regarding claims 25-27, t the combination of Akihiro et al., Tanaka et al., Tokito et al., and Tsutsui *et al.* disclose the limitations of claim 1.

36 Further, Tanaka *et al.* disclose that the first inorganic compound is a metal oxide of VO_x, MoO_x, or RuO_x (see introduction). The motivation to combine is the same as in claim 1.

37 Regarding claims 29-31, the combination of the combination of Akihiro et al., Tanaka et al., Tokito et al., and Tsutsui *et al.* disclose the limitations of claim 1.

38 Further, Akihiro *et al.* disclose that the luminescent organic material is disposed in a silica matrix (paragraph 12).

39 Regarding claims 33-34, the combination of Akihiro et al., Tanaka et al., Tokito et al., and Tsutsui *et al.* disclose the limitations of claim 1.

40 Further, Tokito *et al.* disclose a third inorganic compound is a metal oxide, such as an alkaline earth metal oxide, in particular SrO_x. The motivation to combine is the same as in claim 1.

41 Regarding claim 35, the combination of Akihiro et al., Tanaka et al., Tokito et al., and Tsutsui *et al.* disclose the limitations of claim 1. Tokito *et al.* disclose that the metal oxide is SrO_x, and not one of lithium oxide or barium oxide. However, at the time of the invention, one of ordinary skill in the art would have tried barium oxide or lithium oxide because of the similar properties to strontium oxide, such as low work function and electron emission properties.

42 Regarding claim 40, the combination of Akihiro et al., Tanaka et al., Tokito et al., and Tsutsui *et al.* disclose the limitations of claim 1. The combination teach a OLED display that can be used in an electronic appliance selected from the group consisting of a video camera, a digital camera, a goggle-type display, head mount display, a navigation system, a sound reproduction device, an in-car audio system, a audio component, a personal computer, a game machine, a personal digital assistance, a mobile computer, a cellular phone, a portable game machine, an electronic book, and an image reproduction device equipped with a recording medium.

43 Regarding claims 28, 32, and 36-38, , the combination of Akihiro et al., Tanaka et al., Tokito et al., and Tsutsui *et al.* disclose the limitations of claim 1.

44 Further, Tsutsui et al. disclose a metal nitride (such as Ca_3N_2 or Mg_3N_2, paragraphs 21-25) for use in electrodes for hole injection, electron injection, or both hole and electron injection.

45 At the time the invention was made, it would have been obvious to a person having ordinary skill in the art to include the metal nitrides of Tsutsio *et al.* in order to increase the adhesion of the layers to the luminescent layer (abstract, Tsutsio *et al.*).

Response to Arguments

46 Applicant's arguments filed 08/10/2009 have been fully considered but they are not persuasive. Applicant argues that the cited prior arts do not alone or in combination disclose a third inorganic compound that exhibits electron donation property to the third organic compound. Examiner disagrees.

47 Tanaka *et al.* disclose SrO_x as an electron injection material. SrO_x injection electrons from the cathode to the emissive layer where they recombine with holes to produce visible light. When Sro_x is combined with the third organic layer of Akihiro *et al.*, it will inject (donate) electrons to that layer that ultimately combine with holes in the recombination zone of the emissive layer. Examiner also notes that SrO_x is an alkaline-earth metal oxide, the same as disclosed a desirable by the Applicant as the third inorganic compound in paragraph 24 of the PGPUB. Further, specific examples (barium oxide, lithium oxide, ect) disclosed by the Applicant in the same paragraph are, according to Applicant capable of acting as an electron donating material, but are yet well know to have insulating characteristics. It is clear from Tanaka *et al.* that SrO_x is an electron injection material.

Conclusion

48 **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

49 A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

50 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Britt Hanley whose telephone number is (571) 270-3042. The examiner can normally be reached on Monday - Thursday, 6:30a-5:00p ET.

51 If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minh-Toan Ton can be reached on (571)272-2303. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

52 Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see *http://pair-direct.uspto.gov*. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Britt Hanley/
Examiner, Art Unit 2889

/Toan Ton/
Supervisory Patent Examiner, Art Unit 2889